UNIVERSITY of BRADFORD

Module Descriptor

| Module Details | |
|---|---|
| Module Title | Regenerative Medicine |
| Module Code | MHT7013-B |
| Academic Year | 2022/3 |
| Credits | 20 |
| School | Department of Biomedical and Electronics Engineering |
| FHEQ Level | FHEQ Level 7 |

| Contact Hours | |
|---|---|
| Type | Hours |
| Lectures | 24 |
| Directed Study | 170 |
| Online Lecture (Synchronous) | 12 |
| Seminars | 6 |

| Availability | |
|---|---|
| Occurrence | Location / Period |
| BDA | University of Bradford / Semester 1 |

## Module Aims

To stimulate a multidisciplinary understanding of the concepts underlying regenerative medicine (tissue engineering and wound repair).

## Outline Syllabus

This course will provide an overview of cell culture fundamentals, an extensive review on extracellular matrix, followed by topics on cell-cell and cell-matrix interactions. Subsequent lectures will cover the effects of physical (shear, stress, strain), chemical (Cytokines, growth factors), and electrical stimuli on cellular behaviour once cells attach to biomaterials as scaffolds. Tissue engineering will be introduced by reviewing tissue structure and function and the clinical need for tissue repair. An overview of scaffold design and processing for tissue engineering will be reviewed and the application of tissue engineering to specialized tissues and organs will then be addressed in depth. Tissue engineering of specific organ systems will be discussed include skin, muscular skeletal system (vascular grafts, blood substitutions, cardiac patch, and heart valve), nervous system (peripheral and central nervous systems), liver, pancreas, and kidney. The clinical context of tissue engineering including ethical conduct, commercialisation and intellectual property, sustainability, regulatory and legal requirments, health and safety.

| Learning Outcomes | |
|---|---|
| Outcome Number | Description |
| 01 | Understand and apply the scientific method for cell culture and tissue engineering applications |
| 02 | Solve problems systematically mainly cell count, cell viability, population double time, measurement of fibre diameter, porosity and many more. |
| 03 | Understand the whole concept of tissue engineering from production to the clinic including materials selection, materials testing (biomaterials and biological testing), animal studies, human trial, production, sterilisation, packaging and commercial issues such as regulation, safety, ethics and IP. |
| 04 | Understand the whole concepts of regenerative medicine including bone, cartilage, cornea, skin, hair etc. |

## Learning, Teaching and Assessment Strategy

Key lectures will deliver core content, providing students with the opportunity to acquire the information to enhance their knowledge and understanding of subject LO 1,2,3,4. This will be done by interactive teaching sessions with many hands out and questions/answers (LO1,2,3). This will be complemented by a few proble-based learning (PBL) sessions and various examples in Practical Tissue Engineering to allow students to apply this learning principles (LO3,4).

Directed study provides students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge LO 1,2,3,4. Concepts, principles and theories explored in formal lectures and practised in tutorials. Cognitive and personal skills developed in problem solving exercises, tackled by working in small groups supported by members of academic staff.

Main Assessments:
There will be two sets of summative assessments:
1) Presentations (LO3, 4) - (20% total weight, 20 minutes presentation)
2) Summative final coursework (Report) will assess all the learning outcomes expressed in the descriptor (LO1,2,3,4). (80% total weight- 4500 words).

Students need to provide a coursework with 80% of total mark (max 4500 words) followed by an individual presentation with 20% of total mark on a specific task given in the field of regenerative medicine.

Referral (Supplementary):
Student only need to repeat the element they failed.

If student fail the coursework ONLY:
Student need to provide a coursework only with 80% of total mark (Max 4500 words)

If student fail the Presentation ONLY:
Student need to answer one question ONLY which will cover failed presentation (20% of total mark).

If student fail BOTH coursework and Presentation:
Student need to submit coursework and also answer one question which has been described in coursework brief. The question is the replacement of presentation as there will be no presentation in supplementary period. Question need to be embedded within the coursework and submitted at the same time of coursework in a single file.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G). SM4m, SM6m, EA4m, EA5m, D2, D3m, D7m, EL2, P1, P2m, P3, P4, P6, P9m, P10m. Further details of these learning outcomes can be found at https://www.engc.org.uk/.

## Mode of Assessment

| Type | Method | Description | Weighting |
|---|---|---|---|
| Summative | Presentation | Group Presentation (30 Mins) (Supp Answer 1 Presentation Qn) | 20% |
| Summative | Coursework - Written | Report 4000 words | 80% |

## Reading List

To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

*Please note:*
*This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.*

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*https://bradford.ac.uk*